

CONTAINER ASSEMBLY FOR MIXING SUBSTANCES

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention broadly relates to the field of packaging, and more specifically relates to a portion closure that is adapted to release a substance into a container.

2. Description of the Related Technology

Many substances that are in wide commercial use are able to be concentrated by the manufacturer and later reconstituted by the consumer by mixing the concentrated with water. It is often ecologically preferable to use concentrates rather than paying the economic and social costs of transporting the bulkier final product through the distribution chain to the consumer. In addition, the quality of some products is higher when it is reconstituted from a concentrate by the consumer just prior to consumption. For example, many nutritional supplements are best mixed with water immediately before they are consumed.

Accordingly, many products are already being sold in concentrated form, with a variety of different structures having been advanced for mixing and reconstituting the concentrate into the final product.

One disadvantage of using a concentrate is that the consumer will often end up with the concentrate or the final product on his or her hands, which in some cases may be unpleasant or unhealthy, or the concentrate, the water or the final product may be spilled on to other surfaces. In the case of a nutritional supplement, a consumer may purchase the supplement in powdered form in bulk quantities and need to mix the powder with water immediately before use. If the consumer wishes to use the supplement away from home, such as at a gym, either he or she will need to transport the appropriate amount of powder for a single serving in a separate container or

carry the powder in the container and add water at the remote location, which may be inconvenient.

A need exists for a portion closure that provides a safe and convenient way to dispensing a controlled portion of concentrate into a container without the concentrate ever coming into
5 direct contact with the consumer or the surrounding environment.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the invention to provide a portion closure that provides a safe and convenient way to dispense a controlled portion of a concentrate into a container
10 without the concentrate ever coming into direct contact with the consumer or the surrounding environment.

In order to achieve the above and other objects of the invention, a portion closure for a container according to a first aspect of the invention includes a closure main body that is adapted to be mounted to a container, the closure main body defining a storage space in which a
15 concentrate may be stored; a plunger member that is mounted for linear movement with respect to the closure main body between a first, upper, position and a second, lower, position wherein the storage space is caused to open into communication with the container; and tamper evident interlock structure for preventing movement of the plunger member to the second, lower position until the tamper evident interlock means is defeated by a consumer.

20 According to a second aspect of the invention, a portion dispensing container assembly includes a container having an externally threaded finish portion; a closure main body mounted to the finish portion, the closure main body defining a storage space in which a concentrate may be stored; a plunger member that is mounted for linear movement with respect to the closure main body between a first, upper, position and a second, lower, position wherein the storage
25 space is caused to open into communication with the container; and tamper evident interlock structure for preventing movement of the plunger member to the second, lower position until the tamper evident interlock means is defeated by a consumer.

These and various other advantages and features of novelty that characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages, and the objects obtained by its use, reference should be made to the drawings which form a further part hereof, and to the accompanying descriptive matter, in which there is illustrated and described a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a side elevational view of the container assembly that is constructed according to a preferred embodiment of the invention;

FIGURE 2 is an exploded view of a portion dispensing closure that is part of the container assembly that is depicted in FIGURE 1;

FIGURE 3 is a partial cross-sectional view of the assembled portion dispensing closure;

FIGURE 4 is a side elevational view of the portion dispensing closure in a first operational position;

FIGURE 5 is a side elevational view of the portion dispensing closure in a second operational position; and

FIGURE 6 is a diagrammatical view depicting removal of the portion dispensing closure by a consumer for purposes of consuming the contents of the container.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

Referring now to the drawings, wherein like reference numerals designate corresponding structure throughout the views, and referring in particular to FIGURE 1, a portion dispensing container assembly 10 includes a container 12 having an interior space defined therein and, as is best shown in FIGURE 6, an externally threaded finish portion 14. Container 12 is conventional in its construction.

The portion dispensing container assembly 10 further includes a portion dispensing closure 16 that is perhaps best shown in the exploded view that is provided in FIGURE 2.

Portion dispensing closure 16 includes a closure main body 18 having a head portion 20 that is internally threaded so that it may be screwed onto the externally threaded finish portion 14 of the container 12. A tamper evident band 22 is frangibly connected to the head portion 20 of the closure main body 18 by a plurality of frangible bridge elements 26, best shown in FIGURE 3, and is shaped and sized to engage structure 15 on the finish portion 14 of the container 12 so that it will visibly separate from the closure main body 18 when the closure main body 18 is unscrewed from the container 12 by a consumer. The head portion 20 of the closure main body 18 has a circumferential textured outer gripping surface 24 that is designed to help the consumer gripping and twist head portion 20 when it is desired to remove the closure main body 18 from the container 12.

As is further shown in FIGURE 2 closure main body 18 further includes a downwardly depending cylindrical portion 28 that defines an internal storage space 29 in which a substance that is designed to be mixed with fluid from the container 12 is stored. This substance may be, for example, a powdered nutritional supplement that is intended to be mixed with water that is contained within the container 12. Cylindrical portion 28 as a lower surface 29 to which a flexible sealing membrane 32 is attached using an appropriate adhesive. A point of weakness is preferably engineered into either an area of the flexible sealing membrane 32 or the interface surface between the flexible sealing membrane 32 and the lower surface 30 of the cylindrical portion 28 of the closure main body 18.

An upper surface of the head portion 20 of the closure main body 18 is provided with an annular shoulder surface 34 and an upstanding annular upper rim 36 in which an axial bore 38 that is in communication with the storage space 29 is defined. A radially projecting annular bead 65 projects outwardly from upper rim 36, as is best shown in FIGURE 3.

As is further shown in FIGURE 2, a plunger member 40 is mounted for vertical movement with respect to the closure main body 18 between a first, upper, position that is shown in FIGURE 4 and a second, lower, position that is shown in FIGURE 5. Plunger member 40 includes a head portion 42 into an upper end of which is mounted a permanent insert 44 defining a blunt, convex upper surface 46 that is shaped to be comfortably depressed by the fingers or

palm of a consumer. Plunger member 40 further includes a lower, cylindrical portion 48 that is shaped and sized to fit within the axial bore 38 that is defined within the closure main body 18. The head portion 42 of the plunger member 40 is wider when viewed in longitudinal cross-section than the lower, cylindrical portion 48. This defines a circumferentially extending recess, best visible in FIGURE 4, between an underside 52 of the head portion 42 and the upper annular shoulder 34 of the head portion 20 of the closure main body 18 when the plunger member 40 is nested within the closure main body 18.

As is best shown in FIGURE 3, the lowermost terminus of the lower cylindrical portion 48 of the plunger member 40 defines a force concentration structure 50 that is adapted to concentrate downward force that may be applied by the consumer to the plunger member 40 to the area of the engineered point of weakness in the membrane 32 or in the interface between the membrane 32 and the lower surface 30 of the cylindrical portion 28 of the closure main body 18. In the preferred embodiment, force concentration structure 50 comprises a tapered downward projection that is shaped and sized to contact the membrane 32 prior to the rest of the lower cylindrical portion 48.

According to one advantageous feature of the invention, a tamper evident interlock 56 is provided within the circumferentially extending recess described above. In the preferred embodiment of the invention, tamper evident interlock 56 is constructed as a circumferentially extending tamper evident strip 58 that is frangibly connected to the underside 52 of the head portion 42 of the plunger member 40 by a plurality of frangible bridge elements 64. Tamper evident strip 58 further includes an inwardly extending annular lower flange 63 that interacts with the annular bead 65 of the head portion 20 of the closure main body 18 to prevent accidental upward movement of the plunger member 40. The presence of the tamper evident strip 58 between the head portion 42 of the plunger member 40 and the annular shoulder 34 of the head portion 20 of the closure main body 18 prevents a consumer from accidentally depressing the plunger member 40 and moving the plunger member 40 to the second position when there is no intention to do so.

The container assembly 10 will be manufactured with a fluid stored within the container 12 and a concentrated substance stored within the storage space 29 that is within the closure main body 18. The container assembly 10 will be distributed to the consumer as shown in FIGURE 1.

When the consumer desires to consume the contents of the container assembly 10, he or she will first grip the pull tab 60 of the tamper evident strip 58 and progressively, circumferentially pull the tamper evident strip 58 away from the head portion 42 of the plunger member 40, rupturing the frangible bridges 64 and unseating the lower flange 63 from the annular bead 65 in the process. FIGURE 4 depicts the portion dispensing closure 16 with the tamper evident strip 58 so removed. The consumer will then use his or her palm or fingers to depress the blunt, convex surface 46 and thereby drive the plunger member 40 downwardly to the second operational position that is depicted in FIGURE 5. In doing so, the membrane 32 will open at the engineered point of weakness, thereby communicating storage space 29 with the interior of the container 12 so that the concentrated substance within the storage space 29 will be permitted to mix with the fluid that is contained within the container 12. As the plunger member 40 reaches the position shown in FIGURE 5, an inwardly projecting annular bead 53 on the underside 52 of the head portion 42 will slip over and become interlocked with the annular bead 65, thereby deterring upward movement of the plunger member 40. This feature is considered optional, and may not be included in some embodiments of the invention wherein it is desirable to remove the plunger member 40 before drinking.

The consumer may shake the container assembly 10 at this point to ensure thorough mixing of the concentrated material with the liquid. After mixing, the consumer will grip the head portion 20 of the closure main body 18 and unscrew the closure main body 18 from the container 12 in order to consume the contents of the container 12.

It is to be understood, however, that even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and function of the invention, the disclosure is illustrative only, and changes may be made in detail, especially in matters of shape, size and arrangement of parts

within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.